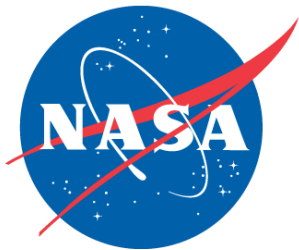


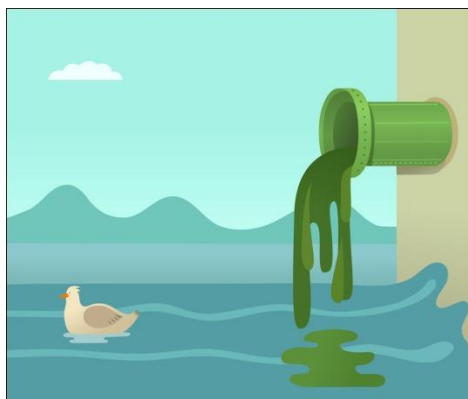
# **Sustainability in NASA Projects**

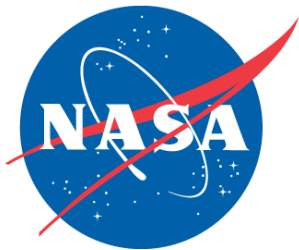
**Olga Dominguez**  
**Assistant Administrator for Strategic Infrastructure**  
**National Aeronautics and Space Administration**  
**Washington DC**  
**November 2011**



# The First Step – Unifying Agency Policy

- To meet the legal requirements & Executive Orders
  - operate in compliance
  - clean-up the past
  - prevent pollution
  - become energy efficient
  - Support the NASA Mission





# NASA's Sustainability Policy

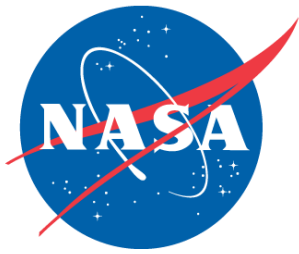
**NASA's sustainability policy is to execute NASA's mission without compromising our planet's resources so that future generations can meet their needs.**

Sustainability also involves taking action now to provide a future where the environment and living conditions are protected and enhanced and **in that future NASA will have the resources it needs to perform its Mission.**

NASA is committed to principles and intent of sustainability.

NASA is integrating sustainability principles and methods into existing systems, processes and decision-making, influencing both long-term planning and short-term actions.

**Sustainability will gradually become part of NASA culture.**



# NASA Sustainable Projects Do What Makes Sense

**Sept. 5, 2003 NASA Policy  
Requiring LEED Silver -  
Matured to LEED Gold -  
Platinum and now Net -  
Zero High-Performance  
Sustainable Designs &  
Green Buildings**



**Propellants North  
facility at Kennedy  
Space Center is a Net  
Zero facility**



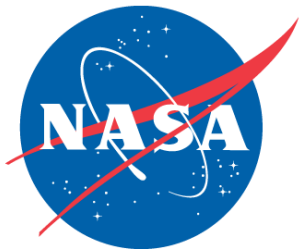
**Exploration Sciences Building at  
Goddard Space Flight Center**



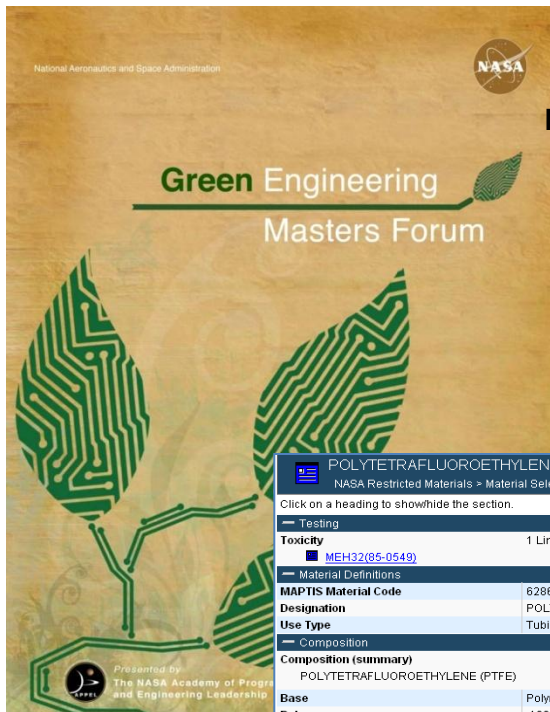
**Marshall Space  
Flight Center**

Building 4600, located at the intersection of Martin and Rideout roads, has been selected by the U.S. Department of Energy as a showcase facility for energy and water efficiency.





# Design Greener Systems & Processes for Programs & Projects & Institution



New Training

Kennedy Space Center  
0.95 MW PV System



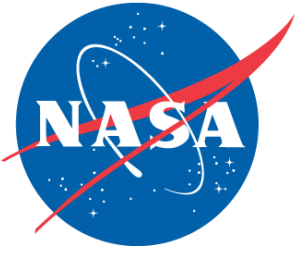
POLYTETRAFLUOROETHYLENE (PTFE)	
NASA Restricted Materials - Material Selection List	
Click on a heading to show/hide the section.	
Testing	
Toxicity	1 Linked Record <a href="#">Show All</a>
Material Definitions	
MAPTIS Material Code	62860
Designation	POLYTETRAFLUOROETHYLENE (PTFE)
Use Type	Tubing, Heat Shrink/Sleeving/Tape
Composition	
Composition (summary)	POLYTETRAFLUOROETHYLENE (PTFE)
Base	Polymer
Polymer	100 %
Material Restrictions	
Restricted Substances	1 Linked Record <a href="#">Show All</a>
Potentially Restricted Substances	1 Linked Record <a href="#">Show All</a>
Specifications	
Further Information	
MIL Components	6 Linked Records <a href="#">Show All</a>

Restricted or Potentially  
Restricted Substances

Source: NASA-MSFC,  
MAPTIS-II



Sustainability Base Ames research Center

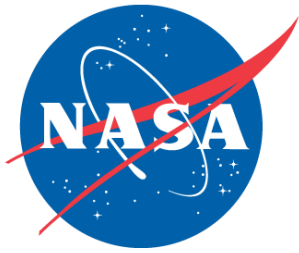


# Vision for a Sustainable NASA

- **Move beyond compliance** – identifying opportunities that meet intent of laws and regulations and provides long-term benefits
- **Effective and efficient use of resources in operations** to minimize waste and carbon emissions
- **Supply chains** work with NASA's contractors to set standards and achieve sustainable goals
- **Facilities** (e.g., buildings, laboratories, test stands) that go beyond LEED requirements to new designs = net-zero energy & water, green roofs, day lighting.... Then integration of sustainable practices into operations & maintenance
- **Green Principles – green chemistry/engineering...** integrated into the design of NASA missions to include operations and hardware

## Integrating Sustainability into what we do





# NASA Has Used The Principles Of Sustainability For Many Years



**Global Electric Motorcar**



## Partnership



Members of the landfill conversion project team stand in front of the central heating plant at the Goddard Space Flight Center. They are (left to right) William Koch, Norman Ransford, Paul Thompson, Mark Chib, Peter Drobowsky, Dorothy Kent, Ann Wagner, Barry Green, and Kathleen Mosley.








Partnering with Prince George's County, MD and the U.S. EPA, NASA's Goddard Space Flight Center awarded a contract to Toro Energy for delivery of up to \$49.9 million of landfill gas over a period of 10 years to be used as the Center's primary heating fuel. The contract provides for construction of a landfill gas treatment facility, a pipeline to deliver the gas to the Center, and conversion of two central heating plant boilers to allow them to burn the gas, as well as natural gas and diesel fuel oil. The project will save Goddard \$1 million a year in heating costs and will prevent as much pollution as taking 100,000 cars off the road.

Trucks pick up trash from the local community and deliver it to a landfill where natural processes convert it to methane gas. The methane is collected, treated, and burned in boilers to produce steam, which is distributed throughout the Goddard complex to power its energy-intensive operations.

Goddard Space Flight Center, Greenbelt, MD

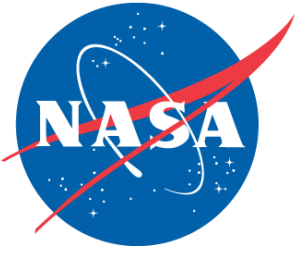


**YOU HAVE the POWER™**

National Aeronautics and Space Administration  
Federal Energy Management Program

For more information on how you can get involved in the You Have the Power campaign, visit the FEMP Web site at [www.eem.gov/femp](http://www.eem.gov/femp).

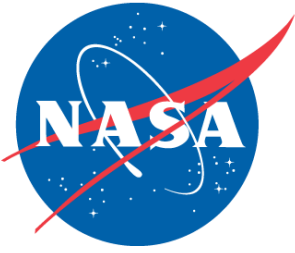


# New Requirements Gradually Become the Status Quo

- **Masterplanning** - Develop masterplans that incorporate sustainable principles - flexible facilities, sustainable construction, walking campus, historic and cultural resources.....
- **Construction** - Construction incorporates sustainability in design and project execution as a requirement – exceptions/waiver are NOT granted.
- **Deconstruction** - Execute demolition using sustainable deconstruction method: maximize salvage, minimize waste, minimize site impact.
- **Operate sustainably** - Re-commission facilities to make them operate to their use and missions, then educate/integrate sustainable practices into operations & maintenance.
- **Utilize unique partnerships** - Leverage Government assets to encourage private development or support R&D.
- **Use science to support planning and design** - Working with NASA climate change scientists to develop planning and design criteria for future facilities.



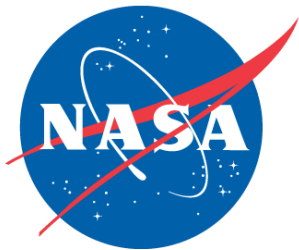


# Why Sustainability

## NASA's Challenges in Supporting Mission

1. aging infrastructure
2. increasing energy cost
3. greenhouse gas management
4. climate change impacts and adaptation
5. changing laws and requirements
6. mandates without added resources
7. environmental cleanup – Apollo Era
8. encroachment – neighbors need water, energy, safety, resources...
9. material availability and obsolescence

**Sustainable Processes & Methods**  
**Create/Drive Innovation**



# How Sustainability Became Imbedded at NASA

**Whenever possible...**

**NO NEW TEAMS!**

Utilize established teams, working groups, and communities of practice familiar with the functional area to get work done

**NO NEW MANAGEMENT!**

Advise existing management, boards, panels, working groups, etc. to ensure that sustainability principles are incorporated into decisions for functional areas

**NO NEW REPORTING!**

Revise existing reports and planning documents generated for the different functional areas to reflect the larger sustainability objectives

**WORK WITHIN NASA CULTURE!**

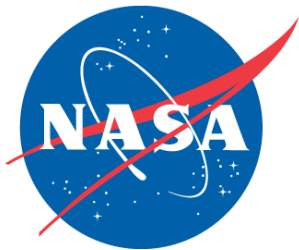
Define and frame NASA's sustainability approach in a way that blends with NASA culture

**ALIGN WITH STRATEGY!**

Link all sustainability goals, requirements, targets, and activities to the NASA Strategy and Mission

**MINIMIZE ADDITIONAL RESOURCES!**

Create opportunities within NASA's existing activities & projects to meet existing & emerging sustainability goals, requirements, & targets by supplementing with additional funding...



# **We Used a Unifying Systems Approach With Existing Processes**

**Because of the multi-disciplinary nature, a sustainability initiative/program needs the coordinated efforts from many communities.**

## **Sustainability**

**Regulatory  
Communication**

**Maintenance and  
Operations**

**Programs and  
Projects**

**Master Planning**

**Energy  
Management**

**Facility Design  
and Construction**

**Water  
Management**

**Materials and  
Processes**

**Supply Chain  
Management**

**Information  
Technology / Data  
Centers**

**Fleet Management**

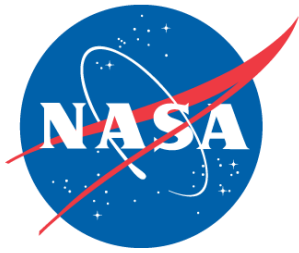
**Recycling  
and Sustainable  
Acquisition**

**Greenhouse Gas  
Management**

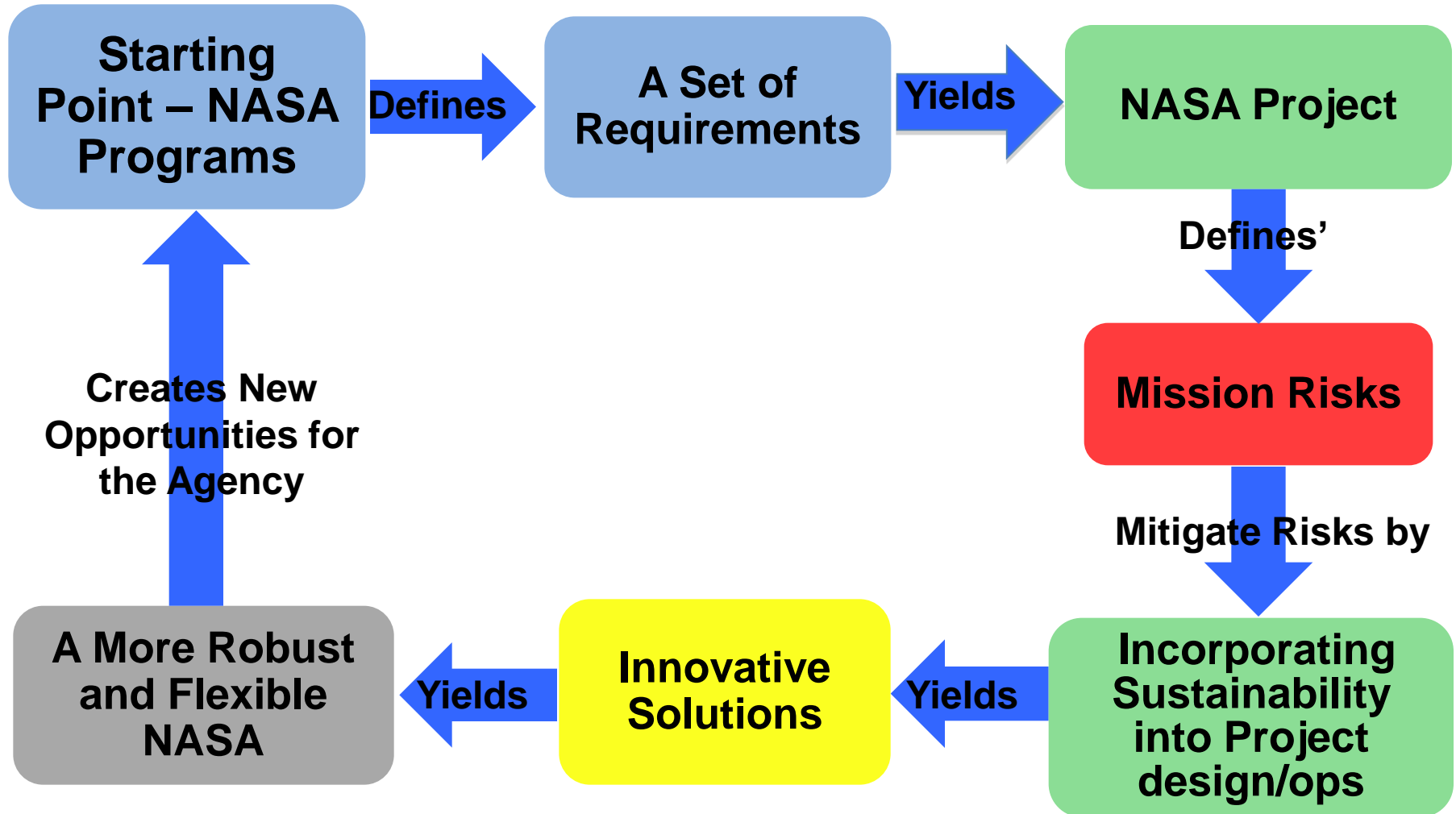
**Climate Change  
Impacts and  
Adaptation**

**Procurement**

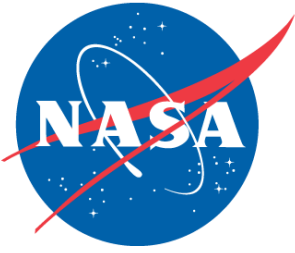
**Natural Resources**



# Integration of Sustainability







# A Path Forward for Integrating Sustainability within NASA

**1**

**View external requirements through the lens of intent and create opportunities**

**2**

**Infuse sustainable thinking into existing systems (ops, design, acquisition, suppliers)**

**3**

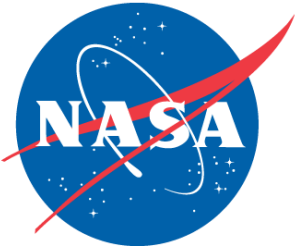
**Design greener systems & processes for NASA programs & projects & institution**

**4**

**Develop new models, systems and processes that support and enhance NASA's Missions**

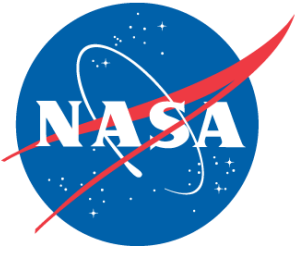
**5**

**Push the envelope of business as usual thru the sustainability lens**



# **New Requirements/Regulations = Opportunities to be Sustainable**

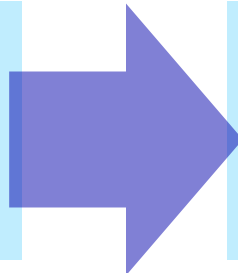
- **Opportunities to think outside the box – to understand intent thereby achieving a different set of results**
- **Understanding that how we measures and set goals affects what we do:**
  - **Reduction in BTU per square foot leads to “tried and true” solutions (compact fluorescent) that yields efficiency – reduction in the cost of energy can yield a different solution (a wind mill) leading to effectiveness**
  - **Controlling/monitoring storm water runoff contaminants (storm water ponds and treatment systems) vs. improving and increasing habitat/environment for animals and humans (green roofs and permeable parking lots)**



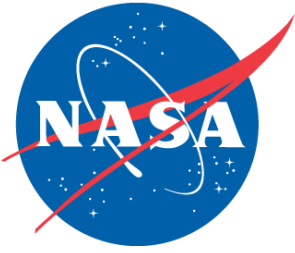
# The Big Questions When Implementing Sustainability

1. How do we budget for sustainability?
2. How do we prioritize actions to get the most sustainability bang for the buck?
3. How do we further sustainability and achieve sustainability objectives and targets when we have no new resources?
4. How do we reframe the conversation within NASA?

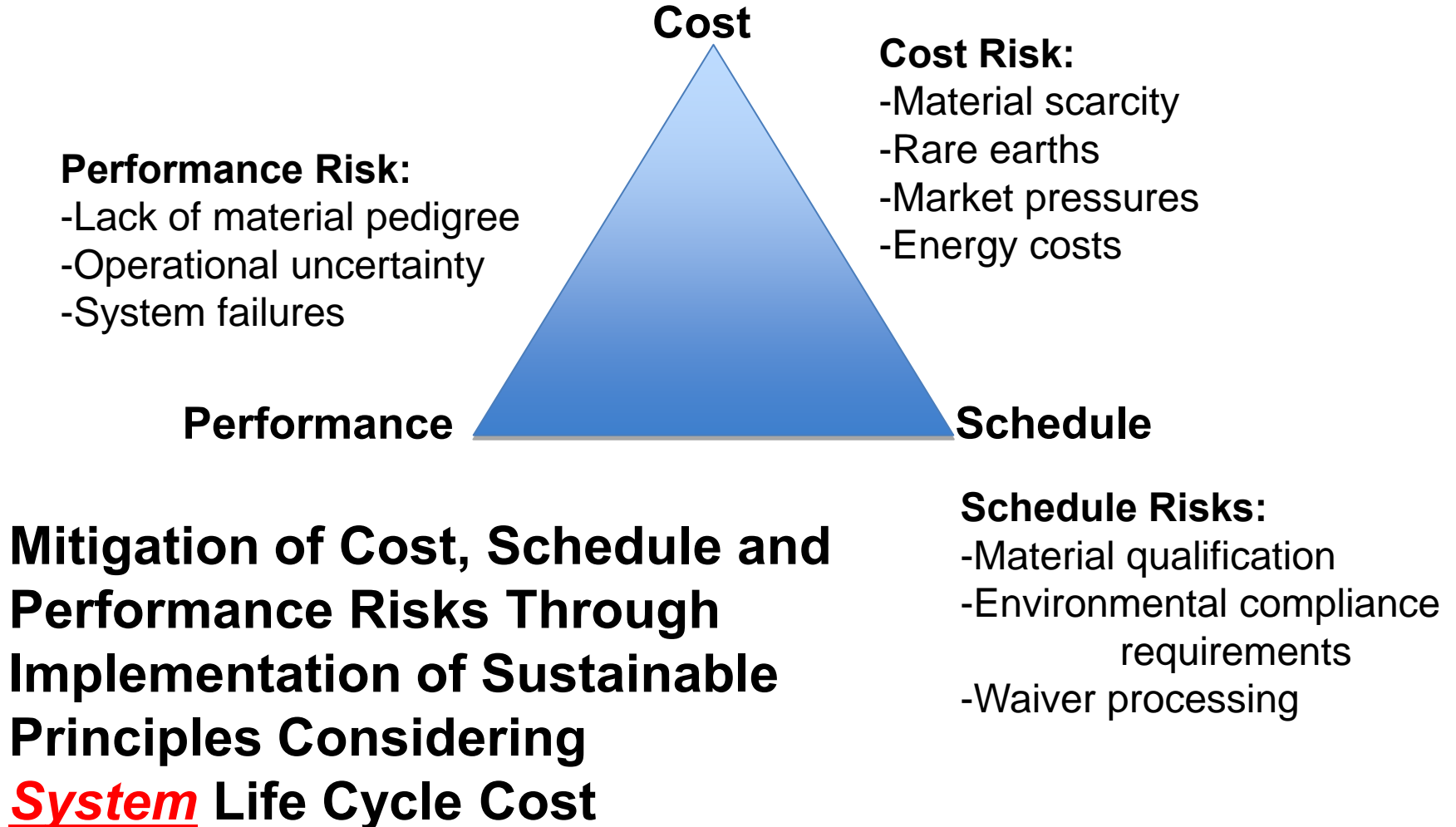
**resource competition**  
between a perceived new  
initiative and NASA mission  
needs



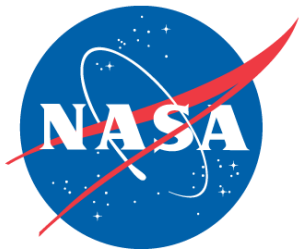
this is investing in a  
sustainable NASA which has  
**greater flexibility and more  
options** in the future



# Infuse Sustainable Thinking Into The Iron Triangle





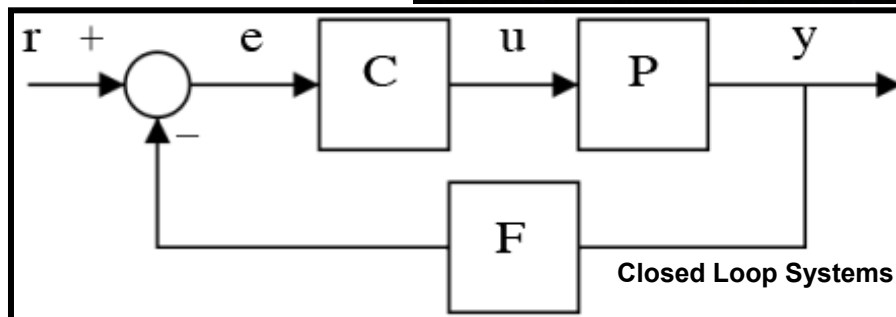


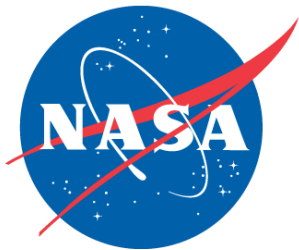
# Use New Models & Systems to Support & Enhance Missions

Harvard Business Review – September 2009 –  
Why ***Sustainability*** is Now the Key Driver of  
***Innovation***



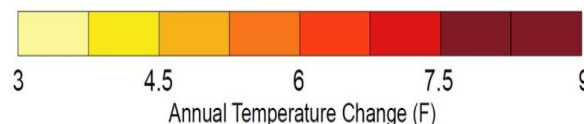
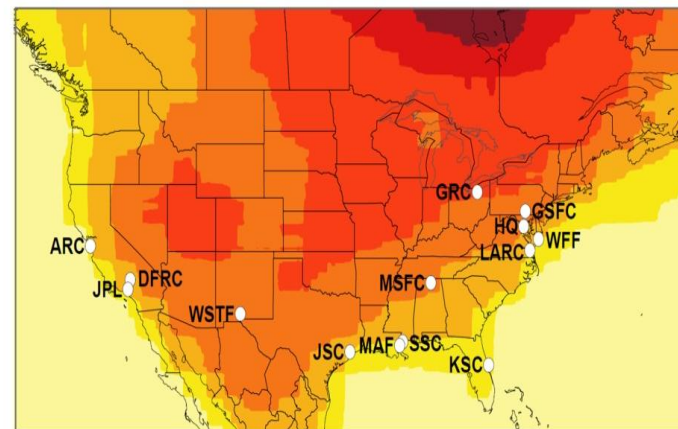
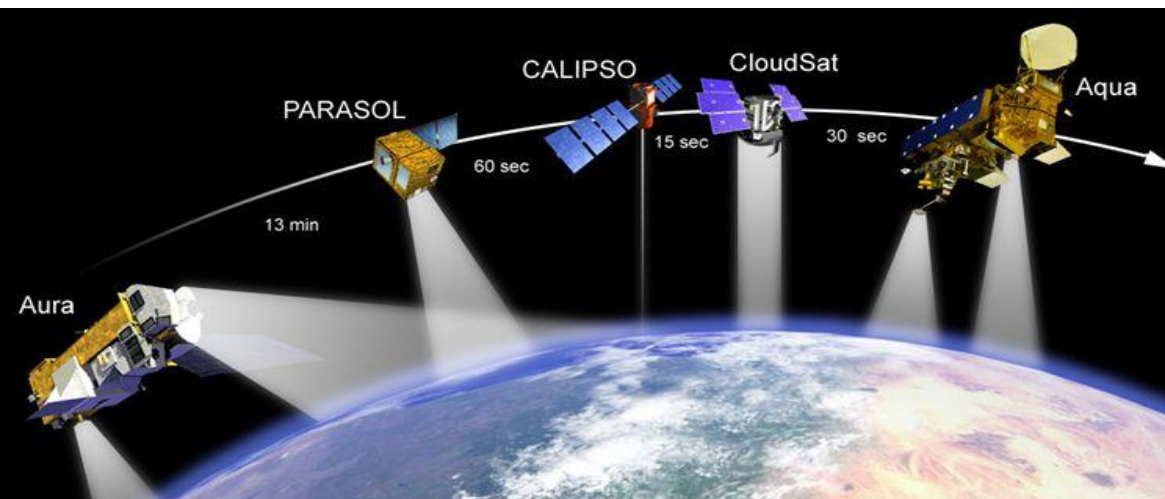
New territory to explore





# Use ALL Available Data/Partners

NASA earth science offers a unique perspective and renowned climate expertise...to quantify real risks...

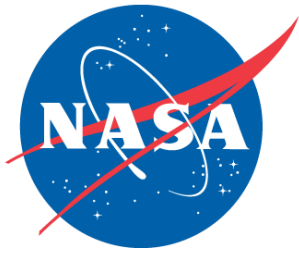


...for an Agency mostly near sea level...



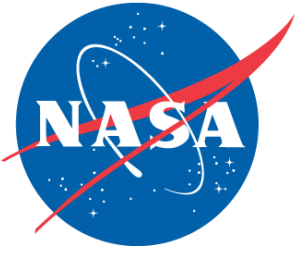
with parts already  
being impacted..





# Future - NASA Centers will be and look Different

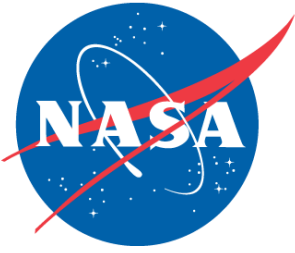




# Key Lessons Learned

1. Environmental regulations are constantly increasing - green house gases, climate change, emerging contaminants – turn this into a creative opportunity.
2. Core compliance programs need to be done via meeting intent (protect human health and the environment) vs. strict compliance
3. Understand that supporting mission activities comes first. If you can't meet mission needs and requirements, it does not matter how green or sustainable it is.
4. **Be consistent, inclusive and persistent – if you have a good idea “NO” is not acceptable – repackage using the language and framework of your intended audience.**





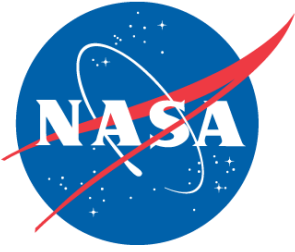
## Challenge - Changing Perception

- Sustainability is about effective program and project management and operations - **NOT compliance** - although compliance is usually achieved.
- Understanding the program/project goals, the desired **sustainable** outcome forces **innovation** and out of the box thinking.

Therefore NASA avoids costs, better supports and protects mission resources, and improves the environment -

**the triple bottom line.**





# •Questions?